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ABSTRACT

This study examined the psychometric pro-properties of the Test Anxiety Scale (TAS). Exploring the factor structure of the TAS was a major focus. Two hundred introductory psychology students completed the TAS. Both orthogonal (varimax) and oblique (direct quartimon) rotations were used to rotate obtained two- and three-factor solutions. The final three factors, derived from an oblique rotation, were Emotionality, Cognitive Interference and Negative Test Taking Attitude. (Author)

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The Test Anxiety Scale:
A Factor Analysis

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The Test Anxiety Scale:

A Factor Analysis

Abstract

This study examined the psychometric properties of the Test Anxiety Scale (TAS) in part in response to a request for such research by Spielberger, Anton & Bedell (1976). Exploring the factor structure of the TAS was a major focus. Two hundred introductory psychology students completed the TAS. Both orthogonal (varimax) and oblique (direct quartimon) rotations were used to rotate obtained two and three factor solutions. The final three factors, derived from an oblique rotation, were Emotionality, Cognitive Interference and Negative Test Taking Attitude.

Test anxiety was first studied by Mandler and Sarason (1952). Since their pioneering efforts, much attention has been directed toward isolating the components of test anxiety and clarifying the cause of test anxiety's often observed debilitating effects. Much of this work is summarized in Sarason (1980).

During stressful and evaluative situations test anxiety's detrimental effects result primarily from task-irrelevant thought rather than physiological arousal (Wine 1971,1980).

High test-anxious persons become self-preoccupied during evaluative situations and spend much of their time in self-depreciating and task irrelevant thought rather than on the task at hand.

The 37-item Test Anxiety Scale (TAS; Sarason, 1972) is a widely used measure of test anxiety. Following Spielberger, Anton & Bedell's (1976) concern regarding the lack of information on the psychometric properties of the TAS, Richardson,

O'Neil, Whitmore, and Judd (1977) factor analyzed the TAS "to obtain normative data on the TAS and to provide an empirical basis for developing improved measures of worry and emotionality" (p. 704). Principal axes factor analysis was used to factor the intercorrelation matrix of the responses of 1,200 students to the TAS. Richardson et, al. (1977) reported the following:

> The first factor, accounting for 53.45% of the total variance, is clearly defined by (a) cognitive concern and worry about oneself and one's performance on tests, and (b) apparent consequences of this intense worry. Consequences include interference with effective cognitive functioning and a variety of physical and emotional reactions. All items describing physical or autonomatic reactions associated with anxiety (except rapid heartbeat) loaded substantially on this factor.
>
> The second factor, accounting for 31.50% of the total variance, seems to reflect a reaction of emotional distress

> or aversion to the stress of tests that does not involve cognitive worry, interference with performance, or excessive autonomic arousal (p. 704).

Scale construction resulted in 16 and 14 item scales which were moderately intercorrelated ($r=-.24$; $p<.001$) Richardson et. al. (1977) conclude that "apparently it is precisely those students who worry about self and performance who also experience emotionality or the intense autonomic reactions associated with anxiety" (p. 704).

The present study was undertaken to provide further normative information on the TAS. One specific objective was to explore the effects of using an oblique factor rotation on the obtained factor structure of the TAS rather than exclusively an orthogonal rotation as was reported by Richardson et. al. (1977)

Method

Subjects

Subjects were 200 introductory psychology students whose participation in this study partially fulfilled course requirements. Ninety subjects were men and the remaining 110 subjects were women. All subjects attended two experimental sessions as required to complete their participation in a larger study. During the first session subjects completed the TAS along with other instruments.

Analysis

Item scores were intercorrelated and factored using common factor analysis. Obtained two and three factor solutions were rotated by orthogonal (varimax) and oblique (direct quartimon) rotations. Squared multiple correlations were used as communality estimates. The

final three factor solution, derived from an oblique rotation, was determined appropriate by applying the scree test and considering the psychological interpretability of the alternative solutions (Rummel, 1970).

Results

The obtained three factor solution explained 25% of the total variance and accounted for 64% of the total explained variance in the TAS scores. All three factors were positively intercorrelated.

Factor I (Emotionality) obtained high loadings from items measuring emotional or physiological arousal and general worry before and after tests. Factor I received its highest loading (.63) from the TAS item, "Even when I'm well prepared for a test, I feel very anxious about it". Factor II (Cognitive Interference) was defined by items concerned with cognitive interference and off-task thinking while studying

or taking a test. Factor II received its highest loading (.49) from the TAS item, "During course examinations I find myself thinking of things unrelated to the actual course material". Factor III (Negative Test Taking Attitude) received high loadings from items which reflect a negative or critical attitude toward taking exams. Factor III received its highest loading (.73) from the TAS items, "It seems to me that examination periods ought not to be made the tense situations they are".

Three scales were constructed based on the results of the factor analysis. An item was included in a scale if its loading on a given factor was greater than .25. The internal consistency reliability (Cronback's alpha) for the total 37-item TAS was .87; for the 20 item emotionality scale, .85; for the 9 item cognitive interference scale, .69; and for the 5 item negative test taking attitude scale, .58. The TAS subscales were all moderately and positively intercorrelated with shared variance between 9% and 30%.

Discussion

In contrast to Richardson et. al.'s (1977) lack of support for the two factor theory of anxiety, in this study cognitive and emotional components of test anxiety were differentiated. The cognitive component was also divided into two factors, interferring cognitions and a negative attitude or expectation about one's performance during tests.

An important treatment implication is to carefully assess the precise cognitive nature of clients' test anxiety and then implement an appropriate intervention. Meichenbaum and Butler (1980) provide a useful discussion of test anxiety treatment and the unique meaning of treatment approaches to individual clients.

Future research which examines the factor structure of the TAS should compare alternative methods of factor rotation. If correlated subscales are developed, they should be based upon an oblique rotation of the obtained factor matrix. Orthogonal rotations are appropriate when there is a prior theoretical basis to believe that underlying factors are independent or if empirical investigation demonstrates that obtained factors are not intercorrelated.

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